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Overview

1. The environmental and poverty burden of diseases

- Human health is possibly the most obvious and most appealing indicator of a deteriorating environment.
- More than sixty percent of India's population succumbs to diseases and ailments every year, triggered by environmental causes
- All this misery can be controlled if environment would be better managed
- Old pestilences like malaria, diarrhoeas and malnutrition have increased their prevalence while modern diseases like cancers, cardiovascular ailments and asthma have risen sharply.
- Government agencies and clinicians have focused only on treatments rather than preventing the occurrence of such diseases.
- Environmental health is a fast growing discipline that requires urgent policy attention.

It has long been recognised that the natural and living environments have a significant impact on human health. Increasing evidence of environmental links to diseases suggests that environment has a stronger bearing on human health, than perceived before. Yet environmental causes and change are not considered an important area for intervention to improve health outcomes.

Every year in developing countries alone, an estimated 3 million people die prematurely from water-related diseases and 2 million people die from exposure to stove smoke inside their homes. The largest proportions of these deaths are infants and young children, followed by women. Most of these are from poor rural families who lack access to safe water, sanitation and safe household fuels. Over 680 million people are annually infected by vector-borne diseases or affected by diseases like diarrhoea in India – that is roughly 1 in 2 person suffer from an infectious disease every year. Add to this another 60 million people who constantly suffer from indoor and outdoor air pollution related diseases, 2.3 million suffering the burden of peri-natal ailments and - - - mothers and children who suffer from malnutrition as consequence of all these. The vast majority of diseases and deaths occur in poverty-stricken states, though rich urban centres like Mumbai and Delhi have their own shameful malaise. Another - - million people die from air pollution in the urban environment, and there is a reason to believe that here too the poor suffer most. India is second only to sub-Saharan Africa in terms of deaths and lifetime shortened by disease. All these diseases are attributable to environment, in which these people live and work.

The argument that works in favour of environmental health is simple approach-avoidable and simple interventions are required to get rid of these diseases. The challenge is that they need inter-sectoral, multi-dimensional and coordinated effort of different agencies. The impediments to such an approach are many. Environmental



interventions for health would actually mean empowering people with the right and choice to improve their existing health status, reduced expenditure on personal health and improving household-level and community level incomes by reducing number of sick days (morbidity) and death losses (mortality). This means that bureaucracy will need to be streamlined and directed with some powers; public health institutions will need to interact more actively with other public offices like water and sanitation and town-planning and more importantly people’s institutions and committees.

1.1 Environmental Change and Health

Until recently, the magnitude of health impacts from exposure to various environmental risks and the relative contribution of these risks were not known. Estimates by Murray and Lopez in *The Global Burden of Disease* (Harvard University Press, 1996) suggest that premature death and illness as a result of major environmental health risks account for a fifth of the disease burden in the developing world. This is comparable to malnutrition and larger than all other preventable risk factors and groups of disease causes. By contrast, such environmental health risks contribute less than 5 per cent of the disease burden in rich countries, despite much higher levels of urbanisation, industrial development and energy consumption, which are usually associated with environmental pollution and health problems.

Table 1 : The burden of disease from major environmental risks

| <i>Environmental group</i> | <i>Percentage of total DALYs in each country group</i> | | | | | | | | |
|-----------------------------|--|-------|-------|------------------|-----------------------------|----------------------------|--------------------------|------------------------------|--|
| | Sub-Saharan Africa | India | China | Asia and Pacific | Latin America and Caribbean | former socialist economies | less developed countries | established market economies | |
| Water supply and sanitation | 10 | 9 | 3.5 | 8 | 5.5 | 1.5 | 7 | 1.0 | |
| Malaria | 9 | 0.5 | 0 | 1.5 | 0 | 0 | 3 | 0 | |
| Indoor air pollution | 5.5 | 6 | 9.0 | 4 | 0.5 | 0 | 5 | 0 | |
| Urban air pollution | 1 | 2 | 4.5 | 2 | 3 | 3 | 2 | 1 | |
| Agroindustrial waste | 1 | 1 | 1.5 | 1.5 | 2 | 2 | 1 | 2.5 | |
| All causes | 26.5 | 18.5 | 18.5 | 17 | 11 | 6.5 | 19 | 4.5 | |

Source: Lvovsky and others (1999) based on Murray and Lopez (1996), Smith (1998), and World Bank estimates.

Environmental health – or diseases attributable to environmental causes and change are interpreted differently and therefore estimated differently. A World Bank study of environmental health in Andhra Pradesh the estimates that about 20 percent of India’s burden is attributable to the environment. The study also found that the burden of disease from traditional risks falls disproportionately on the poorest 40 per cent of all



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households. Others like Kirk Smith, attribute – percent of India's burden to environmental causes. The World Bank's study for Andhra Pradesh suggests that – percent of the total diseases are caused by environmental factors.

Environmental health risks, therefore, can be grouped into two broad categories: *Traditional diseases* like anaemia and malnutrition are caused largely by infectious diseases like diarrhoea, malaria and kala azar have yet not been controlled, and modern disease, caused by development that lacks environmental safeguards, such as urban (outdoor) air pollution and exposure to industrial chemicals and waste, including occupational exposure and local environment contamination, pesticide run off etc and lifestyle related ailments.

Traditional hazards, related to poverty and lack of development, such as lack of safe water, scant sanitation and waste disposal, indoor air pollution, and diverse forms of diseases like malaria, cholera, dysentery, diarrhoea, malnourishment and tuberculosis. Traditional environmental hazards affect developing countries and the poor most. Their impact exceeds that of modern health hazards by a ratio of 10 for Africa, 5 for Asian countries (except for China), and 2.5 for the Middle East. Water-borne diseases, caused by inadequate water supply and sanitation, impose an especially large health burden in the African, Asian and Pacific regions, according to the Global Burden of Disease study. In India alone, more than 700,000 children under five years old die annually from diarrhoea. More than half of the world's households use unprocessed solid fuels, particularly biomass (crop residues, wood and dung) for cooking and heating in inefficient stoves without proper ventilation, exposing people – mainly poor women and children – to high levels of indoor air pollution. About half of all these deaths – nearly 1 million – occur in India and China. Vector-borne diseases are affected by a range of environmental conditions and factors, including polluted and standing water; open sewers and certain types of sanitation; clogged storm drains; and floods.

Rich countries and pockets of rich communities with poor countries enjoy better general health largely due to better access to health services and ability to avoid insalubrious environment. The total burden of illness and death from all causes per million people is about half that of developing countries. However, the disease burden from environmental risks is smaller by a factor of ten. A study by Kirk Smith suggests that environment plays a very significant factor for prevalence of disease in developing countries. In India, for example, **60** per cent of all diseases emerge due to environmental causes.

This underscores the basic and neglected fact that while growth in industry, power generation, transport and other attributes of economic development brings new environmental challenges, the largest environmental threats to human health come from poor living conditions that result from the lack of development and growth.



1.2 Burden of traditional diseases in India

Traditional diseases in India are those that are historically present in a community and which have persisted for many years, even centuries. They precede industrialisation. These include infectious diseases such as malaria, dengue, and kala azar, water borne diseases such as polio, diarrhoea, and acute respiratory infections such as TB, pneumonia, bronchitis and high-grade fever. All these cause perennial manifestation like malnutrition and anaemia, which can be passed on across generations.

Traditional diseases remain potent in specific regional pockets, or are sometimes widespread over a geographical area - like malaria across the Indian sub-continent - or sometimes limited to a population, such as those poor communities in Bihar chronically afflicted by kala azar. It is often difficult to segregate traditional from modern diseases, as although the cause may be "modern" (i.e. pollution caused by an industrial activity), the symptoms may closely resemble those of a traditional disease.

The impact of traditional disease cannot be understated. India has the dubious distinction of having one-third of her children born with severe malnourishment, and the government's target of reducing the infant mortality rate from 90 per thousand to 60 by the year 2000 remains a futile endeavour, according to neonatologist, S Meharban Singh of the All India Institute of Medical Sciences, New Delhi. While Pakistan and other South and Southeast Asian countries were able to bring down malnourishment among newborns to less than 30 per cent, it was over 33 per cent in India as against 50 per cent in neighbouring Bangladesh. The situation is very grave, particularly in states like Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan. Over 50 to 60 per cent of children below the age of five had stunted growth or malnourishment.

Traditional diseases often coexist with each other, or manifest themselves at the same time, and have long-term connections to other ailments. For instance, severe malaria and filariasis can induce persistent anaemia and malnourishment. About 70 per cent of pregnant women in one Orissa study were anaemic (Anon, Reproductive health in three districts of Orissa, UNICEF/UNWASS, 1992, mimeo). The main reasons for anaemia in this setting are deficiencies of iron and folate, a form of Vitamin B, resulting from poor diet and malarial and hookworm infections. Severe malarial anaemia resulting in haemorrhage is a major cause of death among pregnant women. Low maternal haemoglobin, caused by anaemia, strongly predicts pre-term delivery and low birth weight. Such babies are significantly more susceptible to other infections and have a higher risk of dying during infancy. Those who survive are at greater risk of poor growth and development. Both Africa and India experience high rates of child morbidity and mortality from anaemia. Severe anaemia is the most common complication of malaria in children aged six months to two years living in malaria-endemic regions of India. The recently released National Human Development Report by the Planning Commission shows that 74 percent of India's children suffer from anaemia and surprisingly many better-off states contribute a higher proportion than many poor states. Similarly, kala azar-endemic areas in Bihar and across the sub-continent also indicate a high



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prevalence and co-existence of other parasitic diseases like intestinal worms and chronic and acute diarrhoeas.

The Environmental Link

Environment has a critical role in maintaining traditional disease. For example, chronic respiratory infections are aggravated through poor air quality in homes where stoves or *chulhas* (used for cooking and heating) use fuels such as wood, dung and agricultural wastes. Women and children who spend more time indoor are most affected. Older folk who remain indoors are prone to developing cataracts and macular degeneration of the cornea. Exposure to chronic indoor air pollution can accelerate the development of cataract in young children and adolescents. Indoor air pollution suppresses immune responses, especially in the lungs. This in turn increases the probability of contracting tuberculosis and other respiratory infections and is often linked to increased risk in contracting tuberculosis and being afflicted by pulmonary disorders and chronic obstructive pulmonary disorders (COPD). Similarly, environmental change plays a crucial role in transmission of infectious disease such as malaria and water borne diseases, which are discussed later in this book.

Among infectious diseases, malaria alone accounts for 577,000 cases every year according to the WHO. A conservative estimate by VP Sharma, eminent malariologist, shows that as much 60 per cent (about 346200 cases) of all malaria cases can be attributed to environmental change.

The poverty link

The most vulnerable groups affected by traditional diseases are the poor, who have limited or no access to resources, facilities and treatment strategies. This is a global pattern. Research in India has very strongly showed the relationship between shocks like ill health and poverty. Ill health and shock reduce the income earning potential of households whilst increasing household expenditure on private medicine and on the purchase of drugs. This combination of reduced income and increased expenditure leads to asset depletion, increased debt and worsening poverty, and so the cycle continues. Traditional (and modern) diseases will continue to be a cause of shocks and concomitant cause of chronic poverty. Ill-health shocks are the single most powerful method of pushing households into poverty. Those who suffer frequent or debilitating shocks are likely to be chronically poor. Those who do not suffer such shocks, or have relatively few of them, have a chance to escape chronic poverty.

Even with the poor the disease discriminates. Kala azar impacts the poorer sections of the community, specially Muslim and Christian households more than Hindu households in villages of Bihar. The cholera epidemics in Delhi occur in slums which are poorest, and among them, those who have been pushed to live along drains and farthest away from the nearest source of safe water and public taps. Malaria too impacts the



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marginalised tribal communities that have little access to medical facilities. In India, the 7.8% tribal population contributes to about 30% of malaria cases of which more than 60% are *Plasmodium vivax* cases – the most lethal type. This section of society also contributes to 75% of all malaria deaths.

It cannot be disputed that malaria causes poverty, and is not just a consequence of it. Areas that have effectively eradicated malaria had substantially higher economic growth rates than regions, which still have malaria. (J. L. Gallup and J. D. Sachs, "The Economic Burden of Malaria," unpublished manuscript Center for International Development at Harvard University, Cambridge, Mass., USA, 1998, (http://www.hiid.harvard.edu/pub/other/mal_wb.pdf)). Malaria affects the demography of a region by increasing infant and child mortality, thus preventing a large proportion of the population from reaching working age. Increased child mortality also leads to increased fertility as women have more children to compensate for those lost to malaria. This is possibly true for other chronic infectious diseases like kala azar, polio and water borne diseases like cholera and dysentery.

Traditional diseases are as much a reality as modern diseases. Both co-exist often confounding the symptoms of one another. As in other industrialised countries where concerted efforts to eliminate primitive diseases like polio, typhoid, malaria, among other worked, while increasing reliance on modern technology to solve human problems and improve living standards added the burden of modern diseases. But unlike the industrialised countries where the transition was marked, the coexistence of the two types has made it difficult to show any such transition (see box : Epidemiologic Transition) .

BOX : Epidemiologic Transition

The *epidemiologic transition theory*, first formulated by Abdel Omran, defined three stages of mortality change. The length of each stage varies with the social and economic milieu of a given population. The first stage, referred to as the *age of pestilence and famine*, prevailed throughout most of human history. This stage was characterised by extremely high death rates that vacillated between peaks and troughs in response to epidemics, famines, and war. Although birth rates were high and fairly stable, high death rates kept population growth at minimal levels. Population numbers might surge in a period of good health and plentiful harvests, only to drop dramatically with an infectious disease pandemic or crop failure. Thomas Malthus, an 18th-century philosopher, interpreted these episodes of population decline as natural "positive checks" keeping population totals from exceeding the resources available to support them.

Near the middle of the 19th century, the epidemic peaks became less frequent. In Europe and North America, life expectancy at birth rose steadily to about 50 years, up from 35 to 40 years during the preceding centuries. The transition entered a new stage, which Omran called the *age of receding pandemics*. A combination of factors, including



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better sanitation, nutrition, and vaccines and medical advances, granted humans limited control over the old demons of infectious and parasitic diseases. Many countries entered this stage later, but as we near the close of the 20th century, most countries have a life expectancy of 50 or above and no longer experience widespread mortality from frequent pandemics. This transition ushered in a new phase in the demographic history of humans: rapid population growth. For the first time, the death rate remained lower than the birth rate for an extended period (see figure). Births far exceeded deaths every year, allowing population totals to climb. This stage of the epidemiologic transition occurred in the late 19th century in Europe and North America and in the early-to mid-20th century in other developed nations. In most of today's developing countries, the transition occurred later, proceeded much more rapidly, and touched off an explosion in population growth in the 1950s and 1960s. This rapid growth continues in many countries today, particularly in Africa, but falling birth rates in recent decades have slowed population growth throughout much of the developing world.

As infectious and parasitic diseases (IPDs) receded, chronic disorders associated with aging, such as cardiovascular diseases and cancers, became the leading causes of death in the United States and most developed countries. Annual death rates fell further and stabilized at about 10 deaths per 1,000 population in the developed regions. Life expectancy at birth rose above 70 years mostly because of declines in death rates among those surviving to middle and older ages. These trends marked the third stage of the mortality transition, *The age of degenerative and man-made diseases*. Omran believed this third stage was driven by "socially determined" factors in developed nations (such as lifestyle changes and better public health), and by medical technology throughout the developing world. Epidemiologic transition theory, in its original form, never stated explicitly that infectious and parasitic diseases would be eliminated. Instead, the theory suggested that the causes of death predominant throughout most of human history would be replaced by chronic degenerative diseases associated with survival into older ages. In the latter part of the 20th century, an unexpected phenomenon occurred: Death rates from some chronic degenerative diseases began to decline rapidly. In the United States, death rates from heart disease (responsible for one of every four deaths in 1968) declined by more than 30 percent between 1968 and 1982. Even more remarkable, the declines were concentrated among people at middle and older ages, a development neither anticipated nor discussed in epidemiologic transition theory. This new trend was occurring simultaneously in nations throughout the developed world and among more advantaged subpopulations in the developing nations. Several researchers proposed extending Omran's transition theory to account for this new trend in death rates.

S. Jay Olshansky and Brian Ault, for example, identified the new pattern as a fourth stage of the epidemiologic transition: *the age of delayed degenerative diseases*. They expected this new stage would be characterized by the lingering presence of the major degenerative causes of death, but with lengthening life expectancies as medical advances permitted individuals with cancer, cardiovascular disease, or other degenerative maladies to survive to older ages. Olshansky and Ault expected gains in life expectancy to arise from lower death rates among the elderly rather than the young. The influence of infectious and parasitic diseases was dismissed because these causes



of death appeared to be declining thanks to modern medicine and improved standards of living. Unique demographic characteristics associated with this "new" pattern of mortality distinguish it from the fourth (or hybrid) stage. Deaths from emerging or re-emerging IPDs are concentrated at younger ages, as in the first stage, but now some diseases are directly associated with the growing population with compromised immune systems—including the elderly and AIDS patients. In addition, a number of genuinely new diseases have emerged as a result of human actions that promote pesticide-resistant diseases, antibiotic-resistant bacteria, and "new" viral diseases. The demographic effects of these re-emerging IPDs are also unique from any previous stage—the age structure can be modified in new ways, life expectancy at birth can decline rather than rise, and birth rates can fall because of lower fecundity among women and men. In short, there is a strong argument that the unique attributes of this "new" trend in infectious disease mortality qualify it as a distinct stage in our epidemiologic history. There is also a compelling argument for the opposite view—that the re-emergence of these ancient killers does not signal a new stage. The past 200 years may be one of many troughs in the influence of IPDs on human population. Further, infectious disease microbes and their vectors have continuously evolved and changed in response to environmental pressures. The influence of antibiotics and insecticides on these microbes and their vectors is not fundamentally different from evolutionary pressures they have faced for millions of years, and the current situation does not constitute a new stage in human mortality.

Adapted from By S. Jay Olshansky, Bruce Carnes, Richard G. Rogers, and Len Smith Infectious Diseases--New and Ancient : Threats to World Health, Population Bulletin, Vol.52 No. 2 July 1997

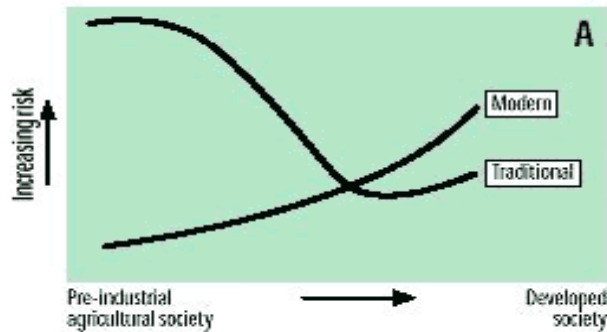
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1.3 The Modern Disease burden of India

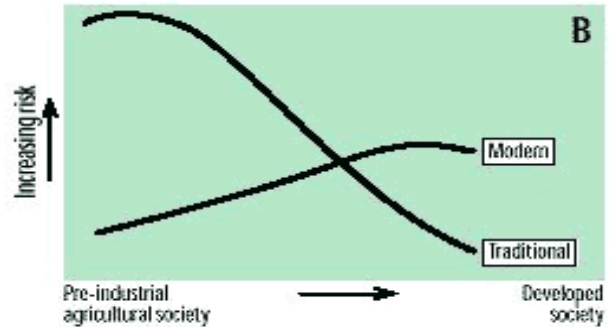
Modern diseases have emerged as a result of the rapid transition from traditional agriculture to industrialisation, a transition involving permanent and profound lifestyle changes. The exponential multiplication and diversification of industrial activity, and the advent of the combustion engine and industrial machines and processes, corresponded with significant intensification of agriculture and the development of new chemicals. This industrialisation led to the serious contamination by pollutants and toxins of earth, water and air, and the contamination of the food chain. With the onset of industrial development, traditional diseases gradually give way to modern diseases. Traditional diseases still contribute a very significant burden of disease, yet modern diseases have also emerged as an important challenge. Air pollution from industry and vehicles is one major challenge, contamination of food with pesticides and metals another.



When environmental health risks are poorly-managed



When environmental health risks are well-managed



Source : WHO, World Health Report 1996

The chemical burden

As a result of the environmental movement, there is a growing concern about the proliferation, persistence, and health effects of chemicals. It is estimated that about 100,000 chemicals are used in commerce worldwide, of which 75,000 are registered in the US. Worldwide, more than one new chemical is introduced every day (including industrial chemicals, pesticides, pharmaceuticals, and food additives). According to guidelines established by the Organization for Economic Cooperation and Development (OECD), each new chemical should undergo a set of tests to assess the potential risk to human health and the environment. (Savings to Governments and Industry Resulting from the OECD Environmental Health and Safety Programme: Part II Support Document, 1998, accessed August 2001, <http://www.oecd.org>). Yet for the majority of chemicals in use today, little is known about carcinogenicity or other, often fatal, health effects. (format source).

Chemical substances are regulated in the US and other developed countries. In the US, there are over a dozen federal statutes implemented by different technical and enforcement agencies. In 1984, only 10 per cent of the pesticides in common use in the US had been assessed for hazards, while virtually nothing was known about 38% of these. As of 1997, only between 1.5 and 3.0 per cent of the approximately 75,000 industrial chemicals used in US commerce have been tested for carcinogenicity (Steingraber, Sandra, Living Downstream, Addison-Wesley Publishing Co., Reading, Massachusetts, 1997.). Moreover, select analyses suggest that we know little about even those industrial chemicals produced in high volumes.



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A study carried out by the Environmental Defense Fund (EDF), a prominent US-based campaign organisation, found that for 71 per cent of high-production volume-regulated chemicals, there is insufficient data to screen using OECD's minimum health hazard screening criteria standards known as Screening Information Data Set (SIDS). (Environmental Defense Fund, Toxic Ignorance: The Continuing Absence of Basic Health Testing for Top-Selling Chemicals in the United States, Environmental Defense Fund, New York, July 1997). SIDS were established by the OECD in 1990 and include statistical information regarding acute, repeated dose, genetic, reproductive and developmental toxicity. For its sample, EDF used those 2,971 compounds listed by the US regulator of pollution and environment protection (the Environment Protection Agency) that are also regulated under a set of US acts (see note 1).

Not only have few chemicals been adequately tested, but the cost of testing makes this prohibitive for developing countries. Estimates of the cost to perform the basic tests recommended by the OECD to assess the impact of chemicals on human health and the environment range from US \$205,000 to US \$275,000 per chemical. The cost of researching on one chemical is more than the annual research budget of Central Pollution Control Board and the National Environmental Engineering Research Institute, Nagpur- the two leading regulatory and research agencies in India on chemical pollution. According to the CPCB Annual report of 2000-2001, their total budget was 40.4 crore rupees of which only 1.38 crores was allocate to their laboratory – which included staff and scientist salaries (http://cpcb.delhi.nic.in/annualrep/Inner/annual_report2000-01-50.htm).

The cost of developing and producing alternative chemical compounds is very expensive. Large and wealthy companies from developed countries therefore build their manufacturing units in developing nations, to exploit developing countries' weak regulations or enforcement regimes. This enables these companies to continue production of hazardous chemicals and pollutants outside their home countries, which in turn places citizens of developing nations at risk. Often, products known to be toxic which had been phased out, restricted in use or banned for production or import in developed countries, are actively marketed in developing and poor countries.

Whilst this trend of dumping both products and waste materials has decreased (because of the work of vigilant multilateral organisations, environmental activists and signatories to international treaties) it has not yet stopped. Despite restrictions in trade of toxic chemicals under the World Trade Organisation regime and the Basel convention, Indian industries import waste from other countries and accept waste to be treated, used and recycled in India. A large number of consignments of waste often languish unclaimed in ports and industrial areas.

Extremely hazardous waste that arrives in India is treated using the same inefficient methods as used for indigenous waste. Between 1997– 2001, about 2 million tonnes of toxic waste arrived in India, most of it metal such as zinc, mercury, and lead from car batteries, as well as plastic waste. In addition, many of the goods imported into India



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legally, such as used computers and machines, many of which include hazardous components, are sent to India because it is cheaper than have them recycled. India is possibly the largest dump yard for the industrialised countries. Toxins dumped in India, often without the government's knowledge, are a worrying and growing public health threat.

Assessing toxicity

Assessing chemical toxicity and its effect on health is problematic. Different age groups and sexes respond differently to varying levels of chemicals, and most health effects become apparent several years later. Often, a combination of chemicals act to produce confounding results. Despite these difficulties, there is increasing evidence of the impact of toxics on human health. Between 10 and 20% of chemicals in the environment may have the potential to cause cancer in humans at low doses. Exposure to chemicals is just one environmental factor, which causes cancer when combined with a person's genetic predispositions to the disease. Others include diet, smoking habits, alcohol consumption, and exposure to sunlight, radiation, and viruses.

From global evidence, local observation and some local research, many diseases and ailments can be attributed to exposure chemicals in India. A study in five villages in Rajasthan on children found that high nitrate ingestion in drinking water causes recurrent acute respiratory tract infections and may be the reason for high mortality in children due to recurrent acute respiratory tract infections in the region (see note 3). Even "safer" pesticides used in homes have been linked to Parkinson's disease (see note 4), breast cancer (note 5) and cognitive dysfunction (note 6). Parental occupation also poses risks to progeny (note 7). Risks are not limited locally but are often widespread. In Turkmenistan, for example, dust richly laden with hazardous pesticides is carried from neighbouring countries. This dust contains anywhere between 1.8 to 126 milligrams of particulate matter per kilogram of dust deposited per hectare of land. Evidence suggest that there is an increase in interstitial lung disease in children in the region. (Note 8).

In India, a study revealed that agricultural dusts are rich in pesticides and fertilisers and harbour bacteria, fungi and other organic and inorganic allergens. These cause allergic respiratory diseases, asthma and other chronic ailments in workers and those in contact with the dust in their surroundings. (note 9). Rivers transport toxic metals and pesticides that impact communities downstream. Seminal work done by researchers at Banaras Hindu University shows that gall bladder cancer along the river Ganga in eastern Uttar Pradesh and Bihar is associated with heavy metals like cadmium and chromium. These enter the food and water consumption cycle from untreated sewage and industrial effluents. (VK Shukla et al, Biliary heavy metal concentrations in carcinoma of the gall bladder : case control study, BMJ Vol.317, Nov.7 1998, pg 1288. The case study is discussed later - see box on Biliary cancer in chapter *, pages #-#).

Reproductive disorders, hormonally related cancers, and infertility appear to be on the rise. During the past 50 years, the rate of testicular cancer in industrialised countries has



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increased by a factor of two to four. Breast cancer mortality in the US has been rising by about one per cent per year since the 1940s. There is some evidence that sperm counts and semen volume may have declined substantially (Carlsen et al. Br. Med. J. 1992;304:609-613). There are also signs that abnormal sexual development in infants may be increasing. A doubling of the incidence of undescended testes in male infants since 1960 has been reported in the United Kingdom (Group JRHCS, Br. Med. J. 1986;293:1401-1404). The increased prevalence of these reproductive problems is puzzling. Although some increases in cancer rates have occurred in the elderly, disturbing conditions have been observed in younger populations. No studies on these issues have as yet been undertaken in India. However, if numbers of reproductive disorders cases and increase in numbers of in-vitro fertilisation (IVF) clinics in India are indicators of trends, then both have risen drastically. According to Indira Hinduja, pioneering gynaecologist based in Mumbai, the number of young couples with problems with conception is increasing rapidly. She estimates that about 40 IVF and fertility clinics exist in Gujarat, Maharashtra and Tamil Nadu alone.

A series of studies on the links between cancer incidence and a wide range of environmental agents, presented at the 13th Conference of the International Society for Environmental Epidemiology (ISEE) in Garmisch, Germany (2–5 September, 2001), revealed disturbing facts. Previous assessments indicated carcinogens caused between 1 – 2 per cent of total cancers. However, Boffetta noted in his presentation that the real figure is much higher. Another study presented at the same conference analysed indoor air quality in Santiago, Chile, a city already suffering from severe atmospheric contamination. High levels of carcinogenic particles were found, produced as a result of heating houses with kerosene, wood, and coal. Among socially disadvantaged people, exposure to these pollutants is very high, frequently higher even than outdoor pollution. “This is worrying because WHO says that there is no threshold below which exposure to these types of carcinogens is safe”, says Lionel Gil of the University of Chile Medical School, Santiago, Chile. Although new regulations have lowered the levels of carcinogens in Santiago and other countries across the world, Gil argues that the cost of reducing air pollution has generally deterred the governments of developing countries from taking all necessary measures.

The lifestyle question

Another serious threat has arisen due to increasing prosperity and the change in lifestyle in many sections of society. Lifestyle-related diseases (LRDs) generally are non-infectious and tend to persist and worsen. Some are disagreeable or debilitating (for example, obesity, attention disorders, constipation and other gut disorders), some are disabling (adult-onset diabetes, hyperlipidemia, hypertension, angina, and osteoporosis), and some are deadly (stroke, heart disease, and cancer). In economically developed countries in North America, Europe, and elsewhere, these diseases have been the chief causes of morbidity and mortality for many years. The incidence of LRDs is growing rapidly in rich pockets of large cities like Delhi and Bombay in India and in other newly industrialised countries like China and South Korea.



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Many LRDs are preventable if adequate precautions are taken. A startling example is that of obesity in minorities in the US. Fast food in the US is heavily subsidised while vegetables and other nutritious produce are usually sold at a premium. The amount of “junk food” consumed by minorities, mostly African Americans and Hispanics, is high. A survey by the American Restaurant and Hotel Association showed that more fast food outlets exist in minority areas than other places and fast-food restaurants prefer these areas over white-residential, university campus, amusement and recreation areas when setting up their outlets. This explosion in the number of fast food restaurants and increase in consumption of fast food has occurred in developing countries too, often led by the middle class and nouveau riche.

In developing countries in Africa, Asia, and Latin America, endemic, acute, nutritional-deficiency and infectious diseases, particularly in babies and children, remain massive public health problems, and largely account for relatively low life expectancy at birth. The pattern of adult diseases has changed dramatically, however, and in many developing countries, circulatory diseases including coronary heart disease, along with cancers, have become the leading causes of death. Even in rich countries, LRDs are a colossal social and economic burden. But developing countries do not have the financial or human resources to treat the new epidemics of LRDs on a national basis. They already have to deal with endemic nutritional deficiencies and infectious diseases. The only rational approach to reducing the incidence of epidemic LRDs is prevention.

Environmental causes of LRDs include smoking, unhealthy diets and physical inactivity. An assortment of cheap tobacco products is readily available on any street corner in India and in most small shops in cities and the countryside. About 185 million people use tobacco in India and the prevalence of tobacco use varies widely from region to region, from 33 to 80 percent among men and 7 to 67 percent among women. Traditionally, the use of tobacco among females has been confined to chewing and to taking snuff. Although the prevalence of smoking among females remains low, it is rising amongst middle and upper class urban women, partly as a result of advertising and product placement in international and national media.



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WHO estimates that nearly half a million Indians die each year as a result of tobacco use and predicts that by 2020 the number will reach 1.5 million annually. By then, it is estimated, tobacco will be solely responsible for 13.3 percent of all deaths in India. The Indian Council on Medical Research estimates that nearly 160,000 people develop cancer in India each year as a result of tobacco consumption, the most common form being oral cancer, for which India has one of the highest incidence rates in the world. It is also estimated that 25 percent of smokers over forty have chronic bronchitis. Healthy diet protects against LRDs. Such a diet should be rich in vegetables and fruits, include a plentiful variety of starchy staple foods (preferably in whole form), contain modest amounts of meat and dairy produce (preferably fish and poultry), and include plenty of dietary fibre, unsaturated fats, vitamins, minerals, and other bioactive compounds. The less saturated fat, sugar, and salt consumed, the better for health. To determine how to prevent epidemic LRDs, both their immediate and root causes must be identified. Policy action plans designed in ignorance of the causes of these diseases are likely to be futile. Solutions that address only the immediate causes, while ignoring the root causes, are likely to be ineffective.

In India few trends exist to support policy, in the beginning of 2002 Indian Council for Medical Research released the national cancer registry for the period 1990- 1996. It showed that cancer incidence grew by 8.8 percent over the previous assessment made 1992 for the year 1988-89. Scattered research exists most of which depends on the motivation of the individual.

SG Kabra, a cancer expert, has been working on pesticide exposure and neural tube defects, lymphomas and leukemia in Jaipur for nearly a decade. His research suggests that pesticide exposure has increased the incidence of these diseases and this is increasing rapidly. He has established a lymphomas and leukemia registry to monitor these trends.

The screening, diagnosis, and treatment of cancers has been overemphasised at the cost of recognising and dealing with these environmental hazards. There is more than sufficient evidence to warrant action. This information needs to be presented to parliaments, regulatory agencies, and the public. This alone would be the single most important way of reducing the incidence of cancer.

There is substantial resistance in the medical community, and bureaucracy (including policy makers) to accept the increasing evidence of the impact of toxics on human health. Despite being a serious threat, chemicals and toxins are least studied by the medical fraternity. Even basic investigation protocols and therapeutic interventions are not developed. The sudden rise of the modern disease epidemics has taken the medical fraternity by surprise. A study found that physicians in Mumbai were significantly under-diagnosing asthma (the prevalence was actually 17%, compared with 3.5% by physician diagnosis (Anon, JAMA Sept 9, 1998, vol 280, no 10 pg 873)). Similarly, an unexplained rise in the number of cancer patients from areas not considered "hotspots" for cancers is alarming doctors (BB Yeole, pers. comm). In India -- and Delhi alone, six new cancer



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treatment hospitals have sprung up in the past five years. Modern diseases are driving environmental health as a discipline. Whilst the approach of integrating health and environment is moving away from being one of confrontation to one of cooperation, the pace is extremely slow.

The concept of environmental health has emerged only in the past 30 years or so and is yet to receive recognition from the medical fraternity. The warning given in Rachel Carson's *Silent Spring* (1962) that pesticides were creating greater problems than they were intended to solve, started off a controversy still raging today between environmentalists and the pesticide industry. Large-scale disasters like Bhopal, Soveso dioxin poisoning (*Am J Epidemiol* 2001; 153:1031–44), the Minamata mercury poisoning have moved governments to create effective policy measures and regulatory bodies, but it does not seem to have deterred industries from producing chemicals or induced them to conduct studies on their safety and long term implications.

Box : So what's killing us?

There is no conclusive data available for disease-wise morbidity and mortality for India. The only authoritative registry in India is the Health Information of India (HII) published by the Central Bureau of Health Intelligence of the Ministry of Health and Family Welfare. The HII is derived from the registries of various other data and statistical offices. Most death and disease case records are incomplete because the collection of data is irregular. Often few cases of deaths and disease are reported to hospitals from where the data is gathered. The HII itself admits to deriving much of its data from the WHO reports as well as from the state and central department sources. It also states that reports like the HII are "ad-hoc". The HII can nevertheless show some pattern of registered deaths annually (see table below).

The WHO annual report of 1999 has provided an in-depth and more realistic estimate of the health situation of India. Using this data, yearly morbidity based on environmental influence on health is segregated into three categories: diseases directly attributable to environmental causes or change, diseases indirectly attributable to environmental causes (or secondary manifestations) and diseases moderately attributable to environmental change. Diseases directly attributable to environmental causes or change are those that are almost or significantly due to environmental factors. This category largely comprises diseases related to poor hygiene and water and sanitation and air pollution caused by indoor, industrial or vehicular pollution. Certain maternal health conditions are manifestations of the cycle of infectious diseases, poverty and malnourishment and hence also included in the category. Diseases moderately related to environmental causes or change are secondary manifestations of diseases caused by environmental factors, which may be less strongly linked to health outcomes.

Mortality by sex, cause and WHO Region, estimates and Burden of disease by sex, cause and WHO region, estimates for 1998.



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| | | | |
|-------------------------|-------------------------|---------------------------------|--------------------------------|
| Population ('000) | 982 223 | 982 223 | |
| | Mortality ('000) | Burden of disease ('000) | Percentage contribution |
| Total deaths/ morbidity | 9337 | 268 953 | |

Diseases directly attributable to environmental causes or change

| | | |
|--|------|-------|
| 1. Infectious and parasitic diseases | 2121 | 67619 |
| 1a : Water-borne Diseases | 730 | 23165 |
| Intestinal nematode infection (Hookworm-disease, Trichuriasis and other intestinal infections) | 2 | 797 |
| Diarrhoeal diseases | 711 | 22005 |
| Polio | 1 | 63 |
| Hepatitis | 16 | 300 |
| 1b : Tropical diseases | 360 | 14632 |
| Leishmaniasis | 30 | 1141 |
| Lymphatic filariasis | 0 | 2063 |
| Malaria | 20 | 577 |
| Dengue | 10 | 353 |
| Japanese encephalitis | 1 | 66 |
| Childhood diseases (includes Pertussis, Diphtheria, and Measles, excludes tetanus, Meningitis) | 299 | 10432 |

| | | |
|---------------------------------------|------|-------|
| Air Pollution | 2534 | 63882 |
| Respiratory infections | 987 | 25556 |
| Acute lower respiratory infections | 969 | 24806 |
| Acute upper respiratory infections | 10 | 274 |
| Respiratory diseases | 284 | 5833 |
| Chronic obstructive pulmonary disease | 153 | 2536 |
| Asthma | 21 | 1525 |
| Other respiratory diseases | 110 | 3352 |

Diseases, indirectly or directly attributable to environmental causes or change

| | | |
|--|-----|-------|
| Maternal conditions includes (Haemorrhage, sepsis, hypertensive disorders of pregnancy, obstructed labour, abortion, other maternal conditions) | 125 | 7891 |
| Nutritional deficiencies | 100 | 10881 |
| Protein-energy malnutrition | 53 | 3734 |
| Iodine deficiency | 5 | 280 |



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| | | |
|--|------|-------|
| Vitamin A deficiency | 16 | 565 |
| Anaemias | 26 | 6302 |
| Perinatal conditions | 612 | 23316 |
| Nutritional/endocrine disorders | 2 | 96 |
| Congenital abnormalities | 153 | 7454 |
| Cancers | 1027 | 14362 |
| Malignant neoplasm | 653 | 8754 |
| Pancreas | 9 | 102 |
| Trachea/bronchus/lung | 79 | 921 |
| Breast | 47 | 711 |
| Cervix | 57 | 836 |
| Lymphoma | 22 | 360 |
| Leukaemia | 18 | 429 |
| Other cancers (including Melanoma and other skin cancers, Corpus uteri, Bladder) | 137 | 2011 |
| Other neoplasms | 5 | 238 |

Moderately related to environmental causes or change

| | | |
|--------------------------------|------|-------|
| Sense organ disorders | 0 | 3701 |
| Glaucoma | 0 | 698 |
| Cataracts | 0 | 3001 |
| Other sense organ disorders | 0 | 2 |
| Cardiovascular diseases | 2820 | 26932 |
| Rheumatic heart disease | 86 | 1793 |
| Ischaemic heart disease | 1471 | 11697 |
| Cerebrovascular disease | 557 | 4814 |
| Inflammatory cardiac disease | 100 | 2071 |
| Other cardiac diseases | 606 | 6556 |
| Cancers | 282 | 3385 |
| Mouth and oropharynx | 100 | 1313 |
| Oesophagus | 62 | 681 |
| Stomach | 51 | 615 |
| Colon/rectum | 25 | 307 |
| Liver | 16 | 176 |
| Ovary | 14 | 206 |
| Prostate | 14 | 87 |
| Other systemic diseases | 133 | 3275 |
| Diabetes mellitus | 102 | 1981 |
| Alzheimer and other dementia | 22 | 922 |
| Parkinson disease | 6 | 138 |
| Multiple sclerosis | 3 | 234 |

(source : adapted from data of WHO (1999) World Health Report –1998, WHO, Geneva)



Box ends here

Micro-level studies done in different states as a part of Human Development Report by the National Council of Applied Economic Research (NCAER) show that in the villages of poorer states (Madhya Pradesh, Rajasthan, Bihar), people succumb to traditional diseases like fevers and diarrhoeal diseases more than those in richer states (Kerala, Punjab, Gujarat). In richer states the most prevalent diseases are lifestyle-related (diabetes, hypertension, cardiac arrests) or linked to air pollution or smoking (asthma, cough and cold, cardiac failure).

HII reports reveal a contrasting picture to the above WHO analyses. Since only registered cases of sickness and death reported in hospitals are collated, the HII numbers are too few and represent a strong urban bias. The advantage of HII reports is that the bias may be more or less uniform. A bias can creep-in in certain states, especially those states that are more urbanised, more efficient in reporting their data or those with more effective public health centres in rural areas, which may skew the overall picture. The assumption therefore is that reporting from all states is of the same quality and the under-reporting is of the same magnitude. On the whole HII reports show a good state-wise trend and general distribution of disease, which the WHO data does not elicit.

Some of the findings from the Health Information of India (HII) report of (1997-98) are:

- **Infectious diseases** claim about 17 per cent of deaths. It claims lives of more men than women. More women in the age groups 15 – 24 and 25-34 years die due to infections than men in these age groups and more young girls die than boys and more adolescent girls die than adolescent men due to infections. North-eastern states have proportionally a high number of deaths due to infectious diseases. Poor states like Madhya Pradesh, Orissa, Rajasthan and UP show a higher mortality due to infectious diseases than the all India average. Among the cities, Delhi, Mumbai and Surat have the highest prevalence of infectious diseases.

- **Respiratory diseases** affect women more than men. It causes 22 per cent of all deaths. Expect for the age group 15 – 24 and 25 – 34, women are most affected in all other age groups. Children of both sexes (0-5) are the most affected groups, accounting for about 28 percent of the total deaths in this class (about 6.2 per cent of the total number of deaths). The progression of deaths from respiratory illnesses decline to the age groups 15- 24 for both the groups till it rises after the age of 35. Northeastern states and poorer states like Rajasthan and Orissa show a high percentage of people dying from respiratory diseases. In Nagaland for example, 53 percent men and 32 percent women die due to respiratory diseases.

The analyses of the WHR 1999 reveals a few startling facts. Diseases directly attributed to environmental change comprise more than 50 per cent of the mortality and morbidity. This is too is a conservative estimate considering that no cancer, systemic diseases or traditional and congenital ailments that are indirectly attributable to environmental factors are accounted. Even if conservative estimates of 30 percent of diseases mentioned in



the second group (Indirectly or directly attributable to environmental causes or change) are attributed to environmental reasons then the mortality and morbidity figures rise to 58 percent. Another conservative addition from the third group (Moderately related to environmental causes or change) shows a further increase to 62 percent.

Traditional diseases and ailments dominate though modern ailments like cancer and asthma, air pollution related diseases and systemic and sense organ diseases are increasing rapidly and have a significantly high numbers.

| Population ('000) | 982 223 | 982 223 |
|---|--|--|
| | Mortality ('000) (% population) | Burden of disease ('000) (% population) |
| Total deaths/ morbidity | 9337 | 268 953 |
| Diseases directly attributable to environmental causes or change | 5015 | 146133 (52%) |
| Indirectly or directly attributable to environmental causes or change | 2017 | 63904 (24%) |
| Moderately related to environmental causes or change | 3235 | 13293 (5%) |
| Total | 10267 | 223330 (80%) |

This assessment shows that accounting estimates for figures for environmental health require a clear definition. The current estimates of the World Bank, the WHO and others, are conservative and will not enable drive policy change, push bureaucracy to change towards inter-sectoral co-ordination or motivate sustainable investments from donors and governments.

Multiple links

Environmental health is another dimension of poverty. The links between poor environmental health and other dimensions of poverty are complex and multiple, reinforcing each other in various ways. Poor people typically face greater environmental health risks in their surroundings because they live in unhealthy locations – such as low-lying and marginal lands – and lack basic infrastructure services, like clean water and sanitation. They are more vulnerable because they are less able – as a result of insufficient education and information, daily drudgery and hardship – to adjust their behaviour to moderate their exposure. Additionally, they are the most susceptible to the effects of such exposures because of the simultaneous effect of several factors, such as exposure to indoor smoke and water-borne pathogens, exacerbated by malnutrition and inadequate health care.

Rapid urbanization and the uncontrolled growth of slums are changing the landscape of environmental health concerns and posing significant new challenges in India. They increase the 'double burden' for the urban and semi-urban poor, adding risks from modern transport and industrial pollution to exposures from dirty cooking fuels, primitive



stoves, crowding, and poor access to water and sanitation. Malaria is also becoming an urban issue in some parts of the world, partly as a result of infrastructure failures such as inadequate drainage systems. Climate change is likely to worsen this situation, while globalisation and the liberalisation of trade may exacerbate the transmission of some diseases.

1.4 Poverty and environment links of diseases

Poverty and environmental degradation are inextricably linked and cannot be seen in isolation. Poverty breeds pollution and vice versa. Environmental health problems are also closely linked to poverty. Environmental factors are estimated to cause 90 per cent of the traditional diseases among the poor including malaria and diarrhoea, according to the WHO. The emerging challenge of modern diseases caused by rapid environmental changes (like air pollution from industries and vehicles) is far reaching and affects the poor and the rich alike. A World Bank study found that one person in Delhi dies every hour due to air pollution-related respiratory diseases. Though the rich may have the resources to protect themselves from pollution, the poor are left more vulnerable.

The poor suffer disproportionately because of the double burden of traditional diseases and modern disease caused by industrialisation and rapid resource depletion. The poor lack adequate access to healthcare facilities, possess low education levels and awareness, live in poor environmental conditions and lack social opportunities to change their current predicament. As a result, social inequalities persist and environmental degradation affects the health of the poor more severely than the more affluent groups. According to the World Bank, in 1998-1999 the richest 20 percent spend 86 percent of the world's wealth. In India, 42.6 per cent of the Gross National Product (GNP) went to the 20 per cent of the population with the highest income levels, compared with only 8.7 per cent shared by 20 per cent of the poorest.

The environmental impact on the health of the poor, in both rural and urban areas, is far reaching. The poorest people often live in arid and tropical lands with limited soil fertility.

Rural areas are more vulnerable to environmental changes because people depend on natural resources and are more likely to be affected from shortages of both food and water, as well as sources of their income when it is based on land cultivation. Environmental degradation is likely to drive them to more fragile environmental conditions. Further environmental pressure causes erosion, depletion of forests and decline in availability of fresh water. Poor nutrition and lack of clean drinking water threatens the health of the rural residents. Moreover, environmental fragility makes them more vulnerable to natural calamities, like floods, droughts, earthquakes, cyclones and heat waves. It is often the poor people residing in marginal areas with inadequate housing who are worst hit by natural disasters. The 1998 cyclone in Gujarat razed more than 13,000 huts as compared to just over 3,000 durable homes. The super cyclone of Orissa in 1999 was followed by severe droughts, reducing crop yields and pushing the poor to the brink of starvation.



Shortages of food due to natural calamities are not the main cause of hunger, malnourished and anaemia. The Food Corporation of India (FCI) for example has been accused of sitting on mounds of grain that are eaten by rats and other pests but not rightfully distributed to the suffering millions. A recent article in Outlook for example narrates that food prices remain artificially high because FCI does not release these rations, and large traders and multinational companies buy these from the godowns and marketed these as package cereals to the middle-class Indian (A Siddiqui, Poverty of Ideas, Outlook May 20, 2002) (see box : **Out of reach**) .

Box 2 : Out of reach : drug prices for the poor

A study of three Indian villages by Vijayendra Rao, studied whether households within the same market pay different prices for identical goods. It is found that not only are unit prices for food heterogeneous, but that the poor pay more for the same goods than the rich. This is because liquidity constraints force poorer households to purchase goods in small quantities and consequently subject them to quantity premiums. However, larger families need to purchase larger quantities, and thus are able to take advantage of lower prices. Households that are most remote also pay the highest prices suggesting that search costs do matter in determining the price level. Quantity premiums seem to matter because families with more land and smaller families pay higher prices because they are likely to purchase smaller quantities in the open market. Families with more land and of smaller size, also face higher prices because they too are likely to purchase food in smaller quantities. Pulses and legumes, which are the primary source of protein for most households, are the goods most affected by such quantity discounts because they are widely consumed but expensive, and thus more likely to be purchased in small amounts. The qualitative work shows that the public distribution system is ineffective in combating the problem, because it is inefficient, corrupt, and limited in scope. This is true for the health delivery system and the purchasing behaviour of medicines.

The National sample Survey Organisation (NSSO) data indicates that escalating health care costs is one of the reasons for indebtedness not only among the poor but also in the middle-income group.

Another study by Satyajit Sahu of University of Waltair, on buying behaviour of malarial drugs in three villages of Orissa showed that the poor delay buying medicines as much as possible, in the hope that the fever would subside, and that it is not malaria. Even when diagnosed, the poor purchase on the daily ration that they can afford. The individual pays 2.5 – 4 times the price for the single dose that they purchase, as compared to buying the entire course of drugs at one time. But the poor seldom have this additional sum of money to buy the medicines. For a breadwinner, the pressure to work and feed the family from daily wages or earnings means that they would prefer not buying a day's dose in order to feed the family. The effectiveness in controlling malaria reduces and often individuals succumb to the fever.

Source : **Vijayendra Rao (2000)** Price Heterogeneity and “Real” Inequality: A Case-Study of Prices and Poverty in Rural South India, **Review of Income and Wealth, Vol. 42 #2, June 2000**



Satyajit Sahu (1998) Buying behaviour of malarial drugs in three villages of Orissa, unpublished MPhil thesis, Department of Social sciences, University of Waltair.

End of box

The urban poor have limited access to facilities like proper sanitation or drinking water and are more exposed to environmental hazards posed by urban pollution and lack of proper chemical waste disposal. Lack of access to clean drinking water and poor sanitation cause the majority of the diseases. In rural areas, the World Bank estimates that only 10 percent of the poor have access to sanitation, compared to almost 60 per cent of the rich in the cities.

Urban poor are also victims of environmental catastrophes. In cities, the poorest segments of societies live slums in low-lying areas, along canals, riverbanks and sewage drains without any access to clean water and proper sanitation. Moreover, urban human and industrial wastes flow through these settlements. During heavy rains and floods, such people are overwhelmed by the rising waters, which cause the rapid outbreak of diseases. The most virulent forms of diseases strike first in these areas, giving enough time for health experts to take cognisance an impending outbreak before it affects the rich. According to the Delhi Development Authority's Master Plan document 1998 – 2002, around 60 per cent of the poor live in areas along one kilometre of either side of the seven *nalas* (sewage drains) and the river Yamuna (which carries the city's untreated sewage and industrial wastes). Many a times these slums also house illegal small-scale, polluting industries, which pose further health hazards to people who work and live there. Workers inhale the air saturated with toxic chemicals and dust and work long hours in unventilated rooms. These people are not compensated if they suffer from health problems caused by occupational hazards, as there is no health cover or insurance.

1.5 The vulnerable groups: Women and children first

Children and women are more susceptible to the effects of environmental pollution. Women, especially pregnant adolescent women, are the first and most lethally affected by malaria and other mosquito-borne fevers. Malnutrition is one of the major causes of women's ill health and increases their vulnerability to environmental hazards, which has an impact on the entire family, especially the children. Malnourished children, who are exposed to toxic contaminants like those who work or live close to lead smelters or battery dump yards, suffer from poisoning as metals like lead, cadmium and mercury readily replaces iron in their blood. Though their condition is reversible, continuous environmental exposure and lack of sufficient nutritional supplements lessen the chances of alleviating the condition. The cumulative impact of a variety of toxic chemicals on vulnerable groups like children, adolescents, pregnant women and young girls has an unknown and unpredictable influence on their growth, development and future health condition.

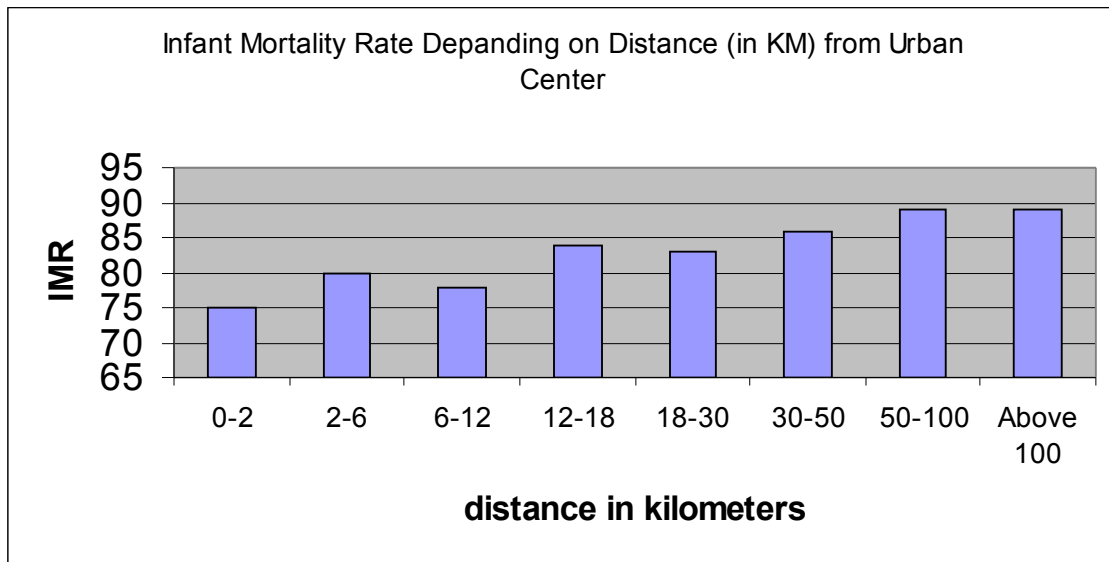


Distances and access to health services too ensure that children and women can least access them. The initial phases of immunisation programmes and child welfare schemes (specially the vitamin A and folate supplementation programmes, for blindness prevention programme) failed largely because children and women could not traverse long distances (see box : Deadly distances).

Box : Deadly distances

Poverty means not only deprivation of income but also deprivation of social chances of people who live in less favourable conditions such as remote rural areas.

In a study done by the National Council for Applied Economic Research (NCAER), it was observed that both differences in income level (average per capita: 4385 Rupees within 2 km in comparison to 3132 Rupees in distance above 100 km) and availability of health care facilities determine the outcome of health condition of population. Infant and child mortality rates increase sharply with increase in distance from urban areas. Areas located far from urban centers are deprived of many health care facilities, including worse access to health care and worse sanitation conditions, which can be the reason for larger number of deaths among infants as well as children below 14 years. Short-term morbidity, often caused by environment-related infections such as diarrhea, also shows a positive relationship with distance, which, once again, can be explained in terms of a decline in the level of medical facilities. Data in the table below shows the infant mortality rate depending on distance from the urban area:



Source: Amitabh Kundu et al Amitabh Kundu, Basanta K Pradhan, A.Subramanian, *Dichotomy or Continuum: An Analysis of Impact of Urban Centres on their Periphery*, Prepared for the Programme of Research on Human Development of the National Council of Applied Economic Research, New Delhi.

End of Box



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In urban areas, where there is lack of fuel wood but no other cooking alternatives are available, plastics are used to ignite fires. In Dharavi, the largest slum in Asia situated in Mumbai, plastics are often used to start cooking fire during the monsoon season. The burning of plastics emits toxic fumes, like dioxins, and causes a range of health problems. Worse, there are no studies done yet on the impact of dioxin on human health.

In rural areas and the fringes of urban settlements, the use of contaminated water for both drinking and hygiene purposes has exposed poor women to water contaminants. Tube wells and hand-pumps in poor and remote areas are broken and are not repaired in most cases. Consequently, women have to walk long distances to fetch water, sometimes from unsafe sources. Often women have to compromise on the quality of water which not only lead to gastrointestinal diseases but also emerging diseases like cervical cancers (caused by papilloma viruses found in polluted and contaminated water) which are increasingly being reported in rural India (see box : cancers of the poor). Increasing deforestation and extraction of firewood and timber means that women need to travel greater distances and also compromise on the quality of fuel wood species that produce more smoke and fume and lead to indoor air pollution.

Economic drain

Beyond the suffering, diseases such as AIDS, malaria, tuberculosis (TB) and many childhood diseases have a direct link to poverty. On an individual level, getting ill can mean economic ruin for the 3 billion people who already scratch a living on less than \$2 a day.

The burden of traditional diseases is a heavy one. Several states in India and many countries in the developing world show prevalence rates of 10-15 per cent of diseases like malaria, cholera and other diseases – which translate into a reduction of GDP per capita of up to 1 per cent per year. TB, which is exacerbated by HIV, takes an economic toll equivalent to \$12 billion from the incomes of poor communities.

India's GDP would probably be about \$100 billion higher now if malaria and other basic diseases had been tackled 30 years ago, when effective control measures first became available. Today, half a million cases of malaria each year lead to the loss of several billion days of productive work, deter investment and prevent children from going to school.

Health and environmental issues are coming together in a unified demand for sustainable development policies in most developed and some developing countries. Unless drastic action are not taken over the next couple of years, negative environmental and health trends will together threaten the many lives in India through disease, environmental degradation and natural calamities.



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There is compelling evidence that environmental and natural resource issues must be addressed as part of any successful effort to eliminate global poverty and improve health conditions. The links between them and poverty are particularly vivid in the devastating toll that environmental degradation takes on human health, the dependence of the poor on natural resources, and their vulnerability to natural disasters and climate change. Poor people are well aware of these threats, as interviews with the poor in over 70 developing countries have shown.

The roughly 2.8 billion of the world's people who live on less than \$2 per day are disproportionately affected by poor environmental conditions. They suffer most from the health effects of environmental factors such as dirty water, polluted air, poor sanitation and hazardous waste. Every year, between 5 and 6 million people die in developing countries from water-borne diseases and air pollution. Premature death and illness caused by environmental health risks account for one-fifth of all disease in the developing world, more than the 15 per cent due to malnutrition, and greater than all other preventable risk factors and groups of disease. Diseases associated with environmental factors are highly concentrated among the poor. Around 60 per cent of all malaria deaths, and half of all fatalities from diarrhoea, for example, occur among the four poorest states of India.

In India and other developing countries, improved water and sanitation, cleaner household energy, better housing, vector control, and pollution management can reduce the total burden of disease by an estimated 23 to 29 per cent. And interventions in health care aimed at the diseases linked to environmental factors – such as diarrhoea, respiratory symptoms, eye diseases, and malaria – can cut it by a further 23 to 28 per cent.

Poor people, particularly those living in rural areas, also depend on natural resources such as water, soil and fisheries for subsistence and income. Yet environmental factors are seriously undermining the ability of the poor to wrest a living from natural resources. A study from Zimbabwe shows that the poorest segments of society depend most on forest and other natural resources for their survival. If these resources are destroyed or their stake in their management is withdrawn then severe health outcomes are observed (Will Cavendish diagram)

Soil degradation, for example, now affects an estimated 65 per cent of cropland area in Africa, 51 per cent in Latin America, and 38 per cent in Asia. The livelihoods of more than a billion rural people are at risk as a result of desertification and dryland degradation. Water scarcity is a serious problem in many parts of the world; many countries are already consuming more than 100 per cent of their renewable water resources. Similarly, nearly 3 billion people depend on wood for household heating and cooking, yet many countries face a widening gap between their needs for fuelwood and sustainable supplies of it.



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The links between poverty and the management of natural resources are complex and vary among regions and locations. The poor are particularly vulnerable to shocks from environmental change and natural catastrophes – such as floods, storms, droughts and landslides – and they are also disproportionately affected by them. They tend to live in precarious housing, often located in environmentally vulnerable areas such as flood plains or steep slopes, putting them at greater risk from natural disasters and severe weather.

They also have less capacity to cope with disasters when they occur. It is much harder for them get to credit than better-off households, and they have fewer assets to sell or consume in times of hardship. So the disasters often have catastrophic effects on the poor. The costs of natural disasters are immense. The 1997-1998 El Niño and Southern Oscillation event was directly responsible for 22 disasters that required international assistance; total costs were estimated at \$25 to \$36 billion. Apart from the disasters, El Niño and other climatic and weather phenomenon cause the release of infectious diseases by increasing their range and transporting them to new ranges. According to a paper published in *The Lancet*, diarrhoea cases rose by 200 percent due El Niño in -- . Estimating costs of such fall out is difficult as they occur after a varying length of time and occur in distant and unrelated areas.

Poor nutrition is implicated in more than half of all child deaths worldwide – a proportion unmatched by any infectious disease since the plague in the middle ages. It is closely linked with environmental factors. But planners, politicians and economists often fail to realize this. Serious misapprehensions include the following myths. Food is of course important. But most serious malnutrition is caused by bad sanitation and disease, leading to diarrhoea, especially among young children. Women's status and women's education play a big part in improving nutrition. Improving care of young children is vital. Improving nutrition requires focused action by parents and communities, backed by local and national action in health and public services, especially water and sanitation. Thailand has shown that moderate and severe malnutrition can be reduced by 75 per cent or more in a decade by such means. Vietnam has reduced its malnutrition rates by half in five years by making simple integrated nutrition and health related schemes.

Partly as a result of such measures, the number and percentages of malnourished children have fallen in all regions of the world except poor states of India. Malnourishment is not about access alone. Economists argue that entitlements and inefficient public distribution systems cause greater disparity in food distribution and hence malnourishment. Ecological insecurity and degradation are even greater influences of malnourishment. Malnutrition is related to diseases and the environment. Diseases like malaria, intestinal worms and persistent gastrointestinal infections cause malnutrition. Even expectant mother who suffer nay form of malnourishment reduce the probability of producing healthy children. Pollution from chemicals like pesticides, and heavy metals is another source of malnutrition. Simply put, heavy metals contaminate food and water, which on ingestion can cause forms of anaemia or food absorption and assimilation disorders.



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The connections between lack of access to water and associated natural resources, poverty entrapment and increased risk of disease, and reduced livelihood opportunities at a local level are established facts. At the heart of this crisis is an increasing imbalance between the availability and demand for fresh water. In this increasingly tense contest from the local to the regional, it is the poorest people who invariably lose out.

India, like in the late Victorian times in the United Kingdom or the dark ages of Europe, is associated with squalor and poverty, child labour and disease. Disease frequently confounded the attempts of poor people to lift themselves out of poverty, with the ill health of a child or breadwinner reducing them to poverty once again. Safe water and sanitation helped transform their lives.

This situation continues to afflict the lives of large numbers of people today. One sixth of the world's population (1.1 billion people) remain without access to improved sources of water, and two-fifths (2.4 billion people) lack hygienic sanitation. The exposure to disease this causes contributes to 2.2 million children dying every year. But improved sanitation, safe hygiene practices and clean water can make the world a safer and healthier place for all its children. In India 40 million people still receive unsafe water.

The disparity is even wider locally in India to access clean water. Water 'poverty' affects all poor people, but particularly women. The poor elderly woman in a remote village in Nepal has to devote a large amount of her time and energy to fetching water. In India girls stand in line waiting for water to arrive at the stand-post, rather than attending school. Girls are frequently kept out of school because there are no sanitation facilities to provide privacy and dignity. But the importance of water in poor people's lives goes far beyond the significant health-related outcomes to broader issues of livelihoods and well being. In particular, poor management of water resources has led to degradation of the environment and loss of natural resources on which the livelihoods of so many of the rural poor depend.

Not only is the quantity of water decreasing, it is also deteriorating. Waterborne diseases have also been the scourge of the Indian sub-continent. It is the home of the infamous Asiatic cholera and the birthplace of rotaviruses. Poor households' survival options are very limited at times, and in places, of water scarcity. Highly vulnerable to economic and climatic shocks and with negligible access to finance, the drain on household livelihoods of poor water supplies is considerable. The burden is complex, immense and exhausting.

1.6 The policy gap: Falling between two stools

Until now, our policymakers have not recognised the link between the environment and health. Environmental health issues fall between two stools – the environment ministry does not consider health as a part of its jurisdiction and the health ministry does not consider the impacts of environmental change as part of its portfolio. A recent report on environment and health by the Union ministry of environment and forests (MoEF) has



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failed to address the existing inequalities in health. Moreover, it recommends therapeutic measures to ameliorate the problems of environmental health, rather than mitigating the environmental ills like air and water pollution, which cause health problems. The report fails to comprehend that it is cheaper to control pollution than to meet the costs of health remediation.

The Planning Commission approach paper for the Tenth five year plan has expressed its helplessness in tackling issues of child mortality, nutrition and other regressive trends. In fact the Planning Commission's National Human Development report is so out-dated and fails to see trends in health and environment, which puts in the shadow of doubt whether India's think tank is really thinking ahead, or planning with a vision in mind. The Ministries of Environment and Forests, and Health and Family Welfare have never worked together on a common programme. Therefore most cross cutting issues and challenges remain unaddressed. Many other government report like the Comptroller and Auditor General of India (CAG) reports show that lack of co-ordination and interaction between and within departments and programmes eats into effective and targeted delivery. Many programmes compete and work at cross-purpose with other programmes. According to the Tenth Plan Report of the Planning Commission, in Kanpur district for example the district commissioner oversees 167 development programmes. In Along district of Arunachal Pradesh, 112 programmes are operation – 22 of these focus on health. Despite identifying these loopholes and leaks, very little initiative is taken to plug them.

Holistic approaches

Both modern and traditional diseases have simple solutions. Some of these require individual initiatives (especially for lifestyle related diseases), effective community mobilisation and education (for traditional diseases) and adoption of better technology and use of safer alternatives along with strict regulation (for modern diseases).

Reducing the incidence and impact of traditional disease requires a holistic approach. The complex cycle of disease, malnourishment, poverty and further ill health must be broken. Prevention and treatment of malaria and anaemia during pregnancy and in children under age five should be a high priority for ministry of health policymakers, development agencies and agencies that fund research. Simple protective policies include Vitamin A and zinc supplements for infants and pregnant women, intermittent antimalarial drug treatment for all women during pregnancy, insecticide spraying of households and other vector reservoirs, and use of ITBNs. In three malaria intervention trials in Africa measuring the protective effect of insecticide-impregnated bed nets (ITBNs), malaria mortality decreased along with other specific causes of child mortality. Weight gain was significantly higher among infants who slept under ITBNs.

The myopic policies of our politicians and narrow-mindedness of our bureaucrats should not allow the error of omission in environment or health policy. It is evident that the healthcare system needs to be substantially modified so that it reaches the poor.



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Developing a policy framework, which recognises the link between environment and health, will help to initiate the necessary reforms. Failing that, this sorry scenario is unlikely to change.